

I CLAIM

1. Apparatus for frequency content separating an input signal, said apparatus comprising:
- 5 (i) a plurality of frequency splitting stages, each stage including one or more up-converter and down-converter pairs, an up-converter and down-converter pair serving to receive a complex input signal representing an input bandwidth and to output a first complex output signal representing an upper portion of said input bandwidth and a second complex output signal representing a lower portion of said
10 input bandwidth, said first portion and said second portion being contiguous and together representing said input bandwidth portion.
2. Apparatus as claimed in claim 1, wherein said complex input signal spans a frequency range of $-F$ to $+F$.
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3. Apparatus as claimed in claim 2, wherein said first complex output signal and said second complex output signal both span a frequency range of $-F/2$ to $+F/2$.
4. Apparatus as claimed in claim 1, wherein between frequency splitting stages
20 said first complex output signal and said second complex output signal are combined to form an interleaved complex signal for subsequent processing.
5. Apparatus as claimed in claim 1, wherein said first complex output signal and said second complex output signal each comprise a stream of digital sample values.
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6. Apparatus as claimed in claim 4, wherein said first complex output signal and said second complex output are each decimated to reduce sample rate prior to combination to form said interleaved complex signal.
- 30 7. Apparatus as claimed in claim 6, wherein said first complex output signal and said second complex output signal each have a complex output signal sample rate and

said interleaved complex signal has an interleaved signal sample rate substantially equal to said complex output signal sample rate.

8. Apparatus as claimed in claim 1, wherein one or more of said up-converters
5 and said down-converters comprises a finite impulse response filter.

9. Apparatus as claimed in claim 1, wherein one or more of said up-converters
and said down-converters comprises a local oscillator generating a time varying
coefficient signal by which sample signals are multiplied.

10 10. Apparatus as claimed in claim 9, wherein said coefficient signal has a
predetermined set of values.

11. Apparatus as claimed in claim 10, wherein said predetermined set of values
15 comprises $-1, -\sqrt{2}/2, 0, +\sqrt{2}/2$ and $+1$.

12. Apparatus as claimed in claim 10, wherein said predetermined set of values
comprises $-1, 0$ and $+1$.

20 13. Apparatus as claimed in claim 12, wherein multiplication by said coefficient
values is performed by sample signal multiplexers selecting signals for combination.

14. Apparatus as claimed in claim 1, wherein said up-converter and said down-
converter pairs are formed as a combined conversion unit with shared components.

25 15. Apparatus as claimed in claim 14, wherein said combined conversion unit
includes a poly-phase filter.

16. A method of frequency content separating an input signal, said method
30 comprising the step of:

(i) frequency splitting a complex input signal using a plurality of frequency
splitting stages, each stage including one or more up-converter and down-converter

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pairs, an up-converter and down-converter pair serving to receive said complex input signal representing an input bandwidth and to output a first complex output signal representing an upper portion of said input bandwidth and a second complex output signal representing a lower portion of said input bandwidth, said first portion and said 5 second portion being contiguous and together representing said input bandwidth portion.

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